

Page ID #:588

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7 Attorneys for Plaintiff/Counterdefendant
8 **DATCARD SYSTEMS, INC.**

**IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA**

DATCARD SYSTEMS, INC., a
California corporation,

4 Plaintiff,

5 | V.

6 DATA DISTRIBUTING, LLC, a California Limited Liability Company,

Defendant.

Case No. 11-cv-01434-DOC (VBKx)

**SECOND AMENDED
COMPLAINT FOR PATENT
INFRINGEMENT**

DEMAND FOR JURY TRIAL

9 AND RELATED COUNTERCLAIMS

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1 Plaintiff DatCard Systems, Inc. ("DatCard"), for its Second Amended
2 Complaint against Defendant Data Distributing, LLC ("Data Distributing"),
3 alleges as follows:

4 **PARTIES**

5 1. Plaintiff DatCard is a California corporation having a principal
6 place of business at 7 Goodyear, Irvine, California 92618.

7 2. Upon information and belief, Defendant Data Distributing, LLC is
8 a limited liability company organized and existing under the laws of the state of
9 California, having a principal place of business at 23441 South Pointe Drive,
10 Suite 90, Laguna Hills, CA 92653.

11 3. Data Distributing is in the business of selling various medical disc
12 publishing systems, including without limitation the CD Station and CD/DVD
13 Station products.

14 **JURISDICTION AND VENUE**

15 4. This action arises under the Patent Laws of the United States, 35
16 U.S.C. §§ 100, *et seq.*

17 5. This Court has subject matter jurisdiction pursuant to 28 U.S.C.
18 §§ 1331 and 1338(a).

19 6. Upon information and belief, Data Distributing conducts business
20 throughout the United States, including in this Judicial District, and has
21 committed the acts complained of in this Judicial District and elsewhere.

22 7. Venue is proper in this Judicial District pursuant to 28 U.S.C.
23 § 1391(b), (c) and 1400(b).

24 **FIRST CLAIM FOR RELIEF**

25 **INFRINGEMENT OF U.S. PATENT NO. 7,302,164**

26 8. Plaintiff incorporates by reference and realleges each of the
27 allegations set forth in Paragraphs 1-7 above.

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1 9. On November 27, 2007, U.S. Patent No. 7,302,164 ("the '164
2 Patent"), entitled "System and Method for Producing Medical Image Data Onto
3 Portable Digital Recording Media," was duly and legally issued by the United
4 States Patent and Trademark Office. DatCard is the owner of all right and title,
5 both legal and equitable, to the '164 Patent, and has been the owner of the '164
6 Patent since the date of its issuance. A copy of the '164 Patent, including a
7 copy of the *Ex Parte* Reexamination Certificate issued on January 4, 2011 for
8 the '164 Patent, is attached hereto as Exhibit 1.

9 10. Data Distributing has directly infringed at least Claims 9 and 16 of
10 the '164 Patent at least through its manufacture, sale, offer for sale and use of its
11 medical disc publishing products. These medical disc publishing products
12 include at least the CD PowerPACS software combined with hardware such as
13 the Rimage 2000i, Rimage 5400, or Rimage 7100 ("the Accused Products").

14 11. In addition, Data Distributing has contributed to infringement of
15 the '164 Patent by others. In particular, with knowledge of the '164 Patent,
16 Data Distributing sold the Accused Products, knowing them to be specially
17 adapted to infringe the '164 Patent. The Accused Products are not staple
18 articles or commodities of commerce and are not suitable for substantial non-
19 infringing uses. For example, the Accused Products are specially adapted to be
20 used in connection with a plurality of browsing terminals configured to receive
21 a user selection that defines selected medical image data; and the Accused
22 Products are specially adapted to be used with a medical image server
23 configured to receive medical image data that is generated by a plurality of
24 imaging modalities. DatCard is informed and believes that Data Distributing's
25 customers in fact use the Accused Products in this manner, as they were
26 designed to be used. When used in this manner, direct infringement occurs.
27 DatCard is further informed and believes that Data Distributing knew that such
28 direct infringement would occur when it sold the Accused Products.

1 12. Further, Data Distributing has induced infringement of the '164
2 Patent by others. In particular, with knowledge of the '164 Patent, Data
3 Distributing has instructed its customers to infringe the '164 Patent through
4 their use of the Accused Products and thereby caused its customers to infringe
5 the '164 Patent. For example, Data Distributing has induced its customers to
6 infringe the '164 Patent by instructing customers, among other things, to use the
7 Accused Products to search a database for radiological reports related to medical
8 images that are selected by the user; and by instructing customers to print a label
9 on an optical disc containing the selected images and related radiological
10 reports.

11 13. Data Distributing's acts of direct and indirect infringement have
12 caused damage to DatCard in an amount to be determined at trial.

13 14. Data Distributing's infringement of the '164 Patent is causing
14 irreparable harm to DatCard, for which there is no adequate remedy at law.
15 Data Distributing's infringement will continue, and will continue to cause
16 irreparable harm to DatCard, unless Data Distributing's infringement is enjoined
17 by this Court.

18 15. DatCard is informed and believes that Data Distributing's
19 infringement of the '164 Patent was and is willful and deliberate, entitling
20 DatCard to enhanced damages under 35 U.S.C. § 284 and attorneys' fees and
21 non-taxable costs under 35 U.S.C. § 285.

SECOND CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 7,729,597

24 16. Plaintiff incorporates by reference and realleges each of the
25 allegations set forth in Paragraphs 1-7 above.

17. On June 1, 2010, U.S. Patent No. 7,729,597 ("the '597 Patent"),
18. entitled "System and Method for Producing Medical Image Data Onto Portable
19. Digital Recording Media," was duly and legally issued by the United States

1 Patent and Trademark Office. DatCard is the owner of all right and title, both
2 legal and equitable, to the '597 Patent, and has been the owner of the '597
3 Patent since the date of its issuance. A copy of the '597 Patent is attached
4 hereto as Exhibit 2.

5 18. Data Distributing has directly infringed at least Claims 1 and 6 of
6 the '597 Patent at least through its manufacture, sale, offer for sale and use of its
7 medical disc publishing products. These medical disc publishing products
8 include at least the Accused Products referenced above.

9 19. In addition, Data Distributing has contributed to infringement of
10 the '597 Patent by others. In particular, with knowledge of the '597 Patent,
11 Data Distributing sold the Accused Products, knowing them to be specially
12 adapted to infringe the '597 Patent. The Accused Products are not staple
13 articles or commodities of commerce and are not suitable for substantial non-
14 infringing uses. For example, the Accused Products are specially adapted to be
15 used in connection with databases configured to store medical data related to a
16 patient. DatCard is informed and believes that Data Distributing's customers in
17 fact use the Accused Products in this manner, as they were designed to be used.
18 When used in this manner, direct infringement occurs. DatCard is further
19 informed and believes that Data Distributing knew that such direct infringement
20 would occur when it sold the Accused Products.

21 20. Further, Data Distributing has induced infringement of the '597
22 Patent by others. In particular, with knowledge of the '597 Patent, Data
23 Distributing has instructed its customers to infringe the '597 Patent through
24 their use of the Accused Products and thereby caused its customers to infringe
25 the '597 Patent. For example, Data Distributing has induced its customers to
26 infringe the '597 Patent by instructing customers, among other things, to use the
27 Accused Products to search databases for medical images and radiological
28 reports related to the medical images.

1 21. Data Distributing's acts of direct and indirect infringement have
2 caused damage to DatCard in an amount to be determined at trial.

3 22. Data Distributing's infringement of the '597 Patent is causing
4 irreparable harm to DatCard, for which there is no adequate remedy at law.
5 Data Distributing's infringement will continue, and will continue to cause
6 irreparable harm to DatCard, unless Data Distributing's infringement is enjoined
7 by this Court.

8 **THIRD CLAIM FOR RELIEF**

9 **INFRINGEMENT OF U.S. PATENT NO. 7,734,157**

10 23. Plaintiff incorporates by reference and realleges each of the
11 allegations set forth in Paragraphs 1-7 above.

12 24. On June 8, 2010, U.S. Patent No. 7,734,157 ("the '157 Patent"),
13 entitled "System and Method for Producing Medical Image Data Onto Portable
14 Digital Recording Media," was duly and legally issued by the United States
15 Patent and Trademark Office. DatCard is the owner of all right and title, both
16 legal and equitable, to the '157 Patent, and has been the owner of the '157
17 Patent since the date of its issuance. A copy of the '157 Patent is attached
18 hereto as Exhibit 3.

19 25. Data Distributing has directly infringed at least Claims 1 and 7 of
20 the '157 Patent at least through its manufacture, sale, offer for sale and use of its
21 medical disc publishing products. These medical disc publishing products
22 include at least the Accused Products referenced above.

23 26. In addition, Data Distributing has contributed to infringement of
24 the '157 Patent by others. In particular, with knowledge of the '157 Patent,
25 Data Distributing sold the Accused Products, knowing them to be specially
26 adapted to infringe the '157 Patent. The Accused Products are not staple
27 articles or commodities of commerce and are not suitable for substantial non-
28 infringing uses. For example, the Accused Products are specially adapted to

1 transmit audit data that is specific to the computer-readable medium produced
2 by the Accused Products, where the audit data includes an identification specific
3 to the computer-readable medium, an identification of the requester of the
4 medical data stored on the computer-readable medium, and an identification of
5 the patient whose data is stored on the computer-readable medium. DatCard is
6 informed and believes that Data Distributing's customers in fact use the
7 Accused Products in this manner, as they were designed to be used. When used
8 in this manner, direct infringement occurs. DatCard is further informed and
9 believes that Data Distributing knew that such direct infringement would occur
10 when it sold the Accused Products.

11 27. Further, Data Distributing has induced infringement of the '157
12 Patent by others. In particular, with knowledge of the '157 Patent, Data
13 Distributing has instructed its customers to infringe the '157 Patent through
14 their use of the Accused Products and thereby caused its customers to infringe
15 the '157 Patent. For example, Data Distributing has induced its customers to
16 infringe the '157 Patent by instructing customers, among other things, to use the
17 Accused Products in a manner that results in the transmission of audit data that
18 is specific to the computer-readable medium produced by the Accused Products,
19 where the audit data includes an identification specific to the computer-readable
20 medium, an identification of the requester of the medical data stored on the
21 computer-readable medium, and an identification of the patient whose data is
22 stored on the computer-readable medium.

23 28. Data Distributing's acts of direct and indirect infringement have
24 caused damage to DatCard in an amount to be determined at trial.

25 29. Data Distributing's infringement of the '157 Patent is causing
26 irreparable harm to DatCard, for which there is no adequate remedy at law.
27 Data Distributing's infringement will continue, and will continue to cause
28 irreparable harm to DatCard, unless Data Distributing's infringement is enjoined

1 by this Court.

2 **FOURTH CLAIM FOR RELIEF**

3 **INFRINGEMENT OF U.S. PATENT NO. 7,783,174**

4 30. Plaintiff incorporates by reference and realleges each of the
5 allegations set forth in Paragraphs 1-7 above.

6 31. On August 24, 2010, U.S. Patent No. 7,783,174 ("the '174
7 Patent"), entitled "System and Method for Producing Medical Image Data Onto
8 Portable Digital Recording Media," was duly and legally issued by the United
9 States Patent and Trademark Office. DatCard is the owner of all right and title,
10 both legal and equitable, to the '174 Patent, and has been the owner of the '174
11 Patent since the date of its issuance. A copy of the '174 Patent is attached
12 hereto as Exhibit 4.

13 32. Data Distributing has directly infringed at least Claims 1 and 8 of
14 the '174 Patent at least through its manufacture, sale, offer for sale and use of its
15 medical disc publishing products. These medical disc publishing products
16 include at least the Accused Products referenced above.

17 33. In addition, Data Distributing has contributed to infringement of
18 the '174 Patent by others. In particular, with knowledge of the '174 Patent,
19 Data Distributing sold the Accused Products, knowing them to be specially
20 adapted to infringe the '174 Patent. The Accused Products are not staple
21 articles or commodities of commerce and are not suitable for substantial non-
22 infringing uses. For example, the Accused Products are specially adapted to be
23 used in connection with a plurality of browsing terminals configured to receive
24 a user selection that defines selected medical image data; and the Accused
25 Products are specially adapted to be used with a medical image server
26 configured to receive medical image data that is generated by a plurality of
27 imaging modalities. DatCard is informed and believes that Data Distributing's
28 customers in fact use the Accused Products in this manner, as they were

1 designed to be used. When used in this manner, direct infringement occurs.
2 DatCard is further informed and believes that Data Distributing knew that such
3 direct infringement would occur when it sold the Accused Products.

4 34. Further, Data Distributing has induced infringement of the '174
5 Patent by others. In particular, with knowledge of the '174 Patent, Data
6 Distributing has instructed its customers to infringe the '174 Patent through
7 their use of the Accused Products and thereby caused its customers to infringe
8 the '174 Patent. For example, Data Distributing has induced its customers to
9 infringe the '174 Patent by instructing customers, among other things, to use the
10 Accused Products to search a database for radiological reports related to medical
11 images that are selected by the user; and by instructing customers to label an
12 optical disc containing the selected images and related radiological reports.

13 35. Data Distributing's acts of infringement have caused damage to
14 DatCard in an amount to be determined at trial.

15 36. Data Distributing's infringement of the '174 Patent is causing
16 irreparable harm to DatCard, for which there is no adequate remedy at law.
17 Data Distributing's infringement will continue, and will continue to cause
18 irreparable harm to DatCard, unless Data Distributing's infringement is enjoined
19 by this Court.

FIFTH CLAIM FOR RELIEF

INFRINGEMENT OF U.S. PATENT NO. 7,801,422

22 37. Plaintiff incorporates by reference and realleges each of the
23 allegations set forth in Paragraphs 1-7 above.

24 38. On September 21, 2010, U.S. Patent No. 7,801,422 ("the '422
25 Patent"), entitled "System and Method for Producing Medical Image Data Onto
26 Portable Digital Recording Media," was duly and legally issued by the United
27 States Patent and Trademark Office. DatCard is the owner of all right and title,
28 both legal and equitable, to the '422 Patent, and has been the owner of the '422

1 Patent since the date of its issuance. A copy of the '422 Patent is attached
2 hereto as Exhibit 5.

3 39. Data Distributing has directly infringed at least Claims 1 and 8 of
4 the '422 Patent at least through its manufacture, sale, offer for sale and use of its
5 medical disc publishing products. These medical disc publishing products
6 include at least the Accused Products referenced above.

7 40. In addition, Data Distributing has contributed to infringement of
8 the '422 Patent by others. In particular, with knowledge of the '422 Patent,
9 Data Distributing sold the Accused Products, knowing them to be specially
10 adapted to infringe the '422 Patent. The Accused Products are not staple
11 articles or commodities of commerce and are not suitable for substantial non-
12 infringing uses. For example, the Accused Products are specially adapted to
13 detect whether a server has changed within a timeout period after receiving
14 medical image data or related data from a modality and reset the timeout period
15 when the change is detected; and the Accused Products are specially adapted to
16 automatically produce an optical storage medium comprising selected medical
17 image data and related data from the server based on when the timeout period
18 has expired and record on the optical storage medium program code that, when
19 executed, allows viewing of the selected medical image data, wherein the
20 medical image data is formatted in a standard medical imaging format used by a
21 computer configured for viewing the medical image data. DatCard is informed
22 and believes that Data Distributing's customers in fact use the Accused Products
23 in this manner, as they were designed to be used. When used in this manner,
24 direct infringement occurs. DatCard is further informed and believes that Data
25 Distributing knew that such direct infringement would occur when it sold the
26 Accused Products.

27 41. Further, Data Distributing has induced infringement of the '422
28 Patent by others. In particular, with knowledge of the '422 Patent, Data

1 Distributing has instructed its customers to infringe the '422 Patent through
2 their use of the Accused Products and thereby caused its customers to infringe
3 the '422 Patent. For example, Data Distributing has induced its customers to
4 infringe the '422 Patent by instructing customers, among other things, to set the
5 timeout period and the server port for receiving medical image data; and by
6 instructing customers to record data onto CDs and DVDs with the "auto-create"
7 function.

8 42. Data Distributing's acts of infringement have caused damage to
9 DatCard in an amount to be determined at trial.

10 43. Data Distributing's infringement of the '422 Patent is causing
11 irreparable harm to DatCard, for which there is no adequate remedy at law.
12 Data Distributing's infringement will continue, and will continue to cause
13 irreparable harm to DatCard, unless Data Distributing's infringement is enjoined
14 by this Court.

15 **PRAYER FOR RELIEF**

16 WHEREFORE, DatCard prays for judgment and seeks relief as follows:

17 A. A judgment that Data Distributing has directly and indirectly
18 infringed U.S. Patent No. 7,302,164;

19 B. A judgment that Data Distributing has directly and indirectly
20 infringed U.S. Patent No. 7,729,597;

21 C. A judgment that Data Distributing has directly and indirectly
22 infringed U.S. Patent No. 7,734,157;

23 D. A judgment that Data Distributing has directly and indirectly
24 infringed U.S. Patent No. 7,783,174;

25 E. A judgment that Data Distributing has directly and indirectly
26 infringed U.S. Patent No. 7,801,422;

27 F. Preliminary and permanent injunctions against further infringement
28 of U.S. Patent Nos. 7,302,164, 7,729,597, 7,734,157, 7,783,174, and 7,801,422

1 including injunctions against direct infringement, contributory infringement,
2 and induced infringement;

3 G. An award of damages for Data Distributing's infringement of U.S.
4 Patent Nos. 7,302,164, 7,729,597, 7,734,157, 7,783,174, and 7,801,422;

H. A trebling of the award of damages under 35 U.S.C. § 284, or such other enhancement of the award of damages that the Court deems appropriate;

7 I. A declaration that Data Distributing's infringement of U.S. Patent
8 No. 7,302,164 was and is willful, and that this is an exceptional case under 35
9 U.S.C. § 285;

10 J. An award of attorneys' fees and non-taxable costs under 35 U.S.C.
11 § 285 on account of Defendants' willful infringement;

12 || K. An award of taxable costs; and

13 L. Such other and further relief as this Court may deem just and
14 proper.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

19 || Dated: 6/15/12

By: Paul Stewart

Craig S. Summers

Paul A. Stewart

Bridget A. Smith

Attorneys for Plaintiff/Counterdefendant
DATCARD SYSTEMS, INC.

1 **DEMAND FOR JURY TRIAL**

2 Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, Plaintiff
3 DatCard Systems, Inc. demands a trial by jury of all issues raised by the
4 pleadings which are triable by jury.

5
6 Respectfully submitted,

7 KNOBBE, MARTENS, OLSON & BEAR, LLP

8
9 Dated: 6/15/12

By: 

10 Craig S. Summers
11 Paul A. Stewart
12 Bridget A. Smith

13
14 Attorneys for Plaintiff/Counterdefendant
15 DATCARD SYSTEMS, INC.
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(12) **United States Patent**
Wright et al.

(10) **Patent No.:** US 7,302,164 B2
(45) **Date of Patent:** Nov. 27, 2007

(54) **SYSTEM AND METHOD FOR PRODUCING MEDICAL IMAGE DATA ONTO PORTABLE DIGITAL RECORDING MEDIA**

(75) Inventors: **Ken Wright**, Chino Hills, CA (US); **Chet LaGuardia**, Rancho Santa Margarita, CA (US)

(73) Assignee: **Datacard Systems, Inc.**, Irvine, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 945 days.

(21) Appl. No.: 09/761,795

(22) Filed: Jan. 17, 2001

(65) **Prior Publication Data**

US 2002/0048222 A1 Apr. 25, 2002

Related U.S. Application Data

(60) Provisional application No. 60/181,985, filed on Feb. 11, 2000.

(51) **Int. Cl.**

H04N 5/91 (2006.01)

(52) U.S. Cl. 386/95; 386/112; 386/126

(58) **Field of Classification Search** 386/46,
386/95, 125, 126; 600/407; 709/219; 705/2
See application file for complete search history.

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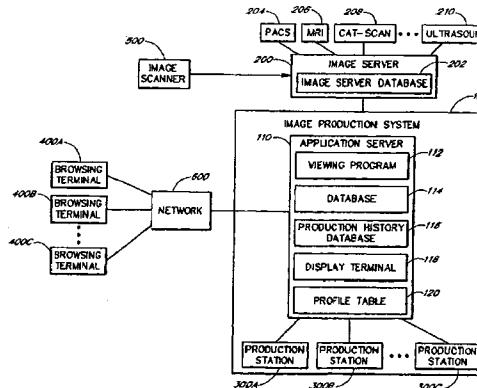
Primary Examiner—Huy Nguyen

(74) *Attorney, Agent, or Firm*—Knobbe, Martens Olson & Bear LLP

(57) **ABSTRACT**

This application discloses a system for recording medical image data for production on a portable digital recording medium such as CDs and DVDs. This system includes a receiving module, a processing module and an output module, with viewing program for viewing medical image data stored on the portable digital recording medium. It also discloses a method of storing medical image data on a portable digital recording medium, including the steps of receiving the medical image data, processing the data and storing the data on the portable digital recording medium, with a viewing program for viewing medical image data stored on the portable digital recording medium. It further discloses a method of selecting medical image data for recording on a portable digital recording medium, including the steps of connecting a browsing terminal to a computer database that stores the medical image data, selecting a first set of the medical image data from the computer database, and recording the selected first set of medical image data on the portable digital medium, with a viewing program for viewing the medical image data stored on the portable digital recording medium. It also discloses the method and system of retrieving medical image data that are related to the received/selected original medical image data, and recording the original and related medical image data on a portable digital recording medium.

27 Claims, 5 Drawing Sheets



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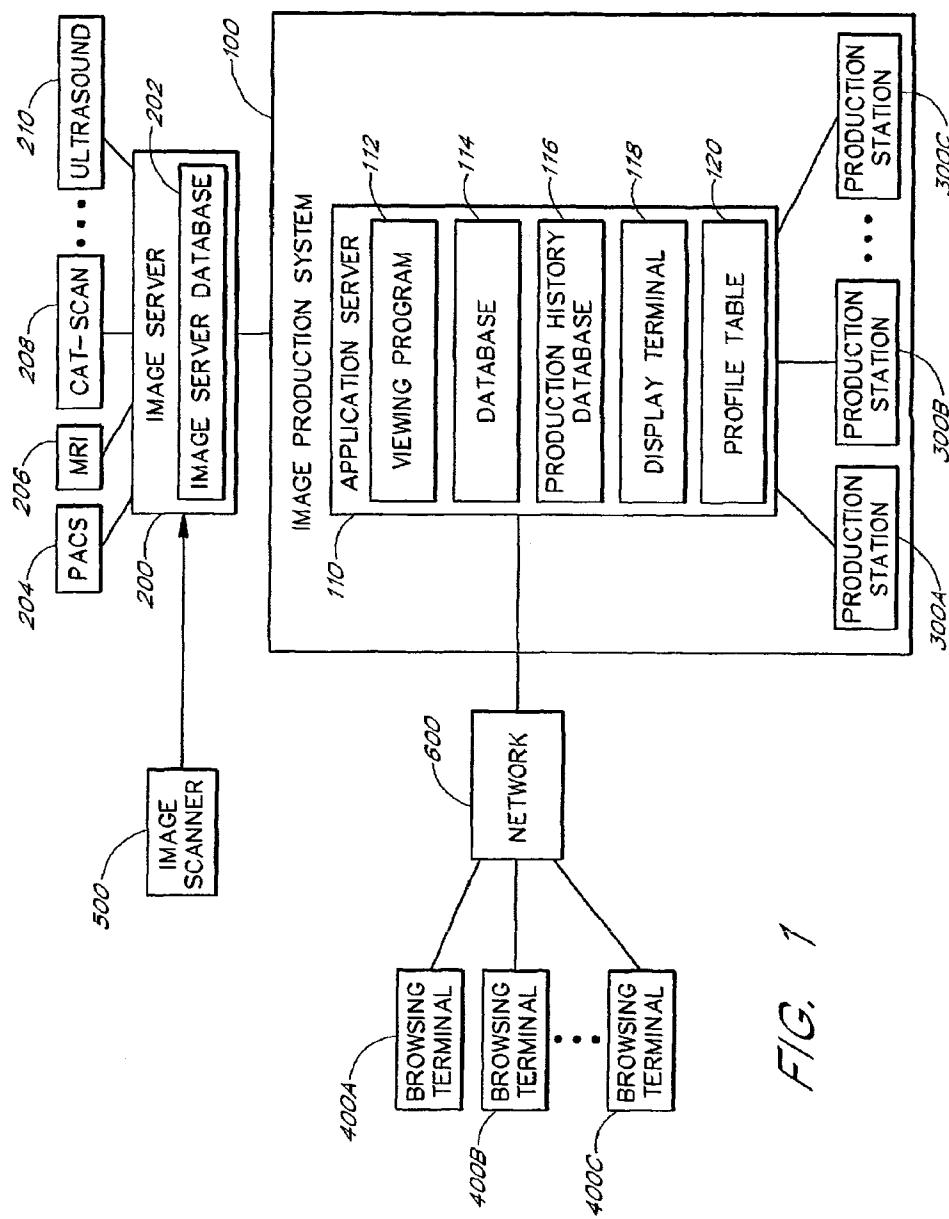


FIG. 1

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IMAGE INPUT DEVICES	IMAGE FIELDS	AUTO-PRODUCE	TARGET PRODUCTION STATION	RELATED DATA STORAGE
MRI MACHINE I		YES	PRODUCTION STATION A	PACS 1
MRI MACHINE II		NO		
ULTRASOUND MACHINE I		YES	PRODUCTION STATION B	PACS 1, PACS 2

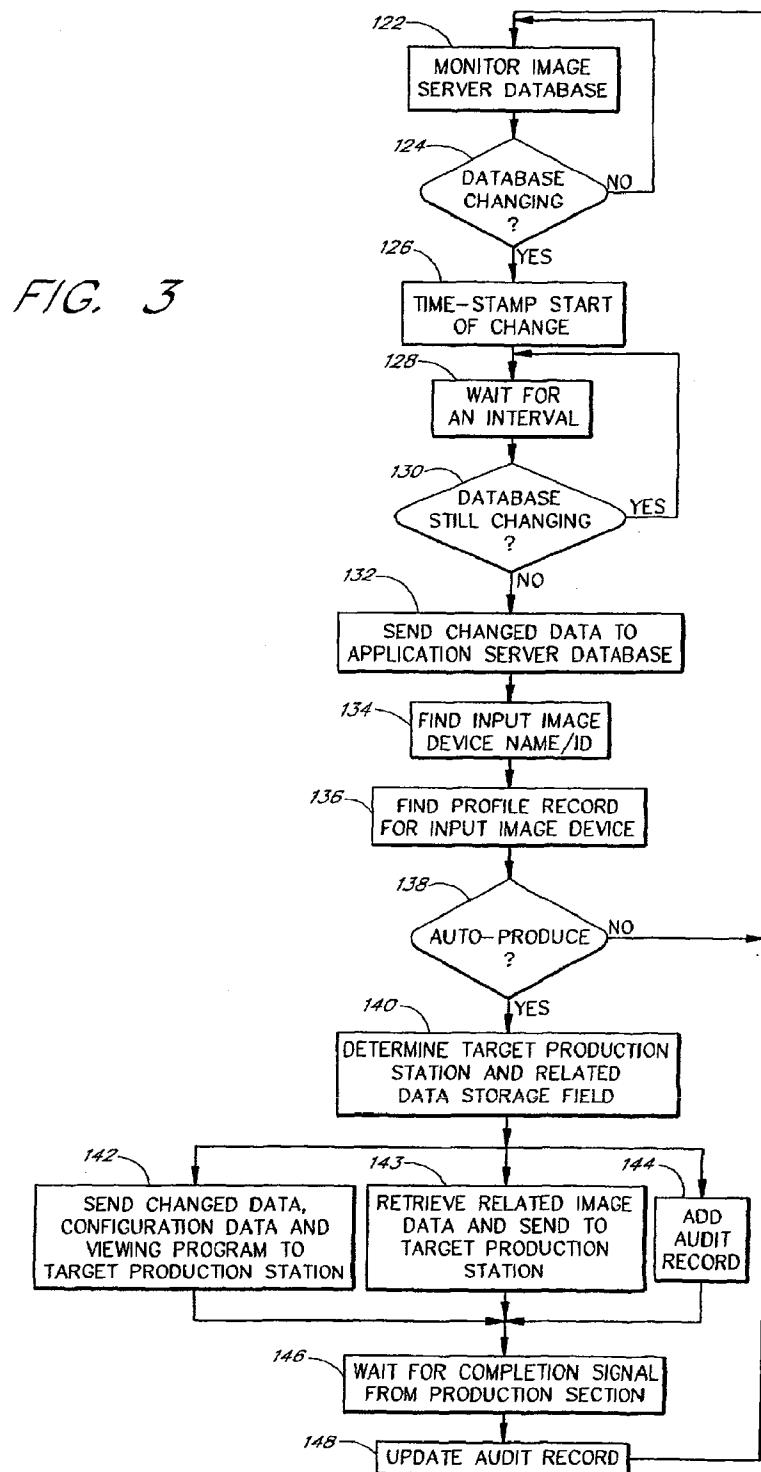
FIG. 2

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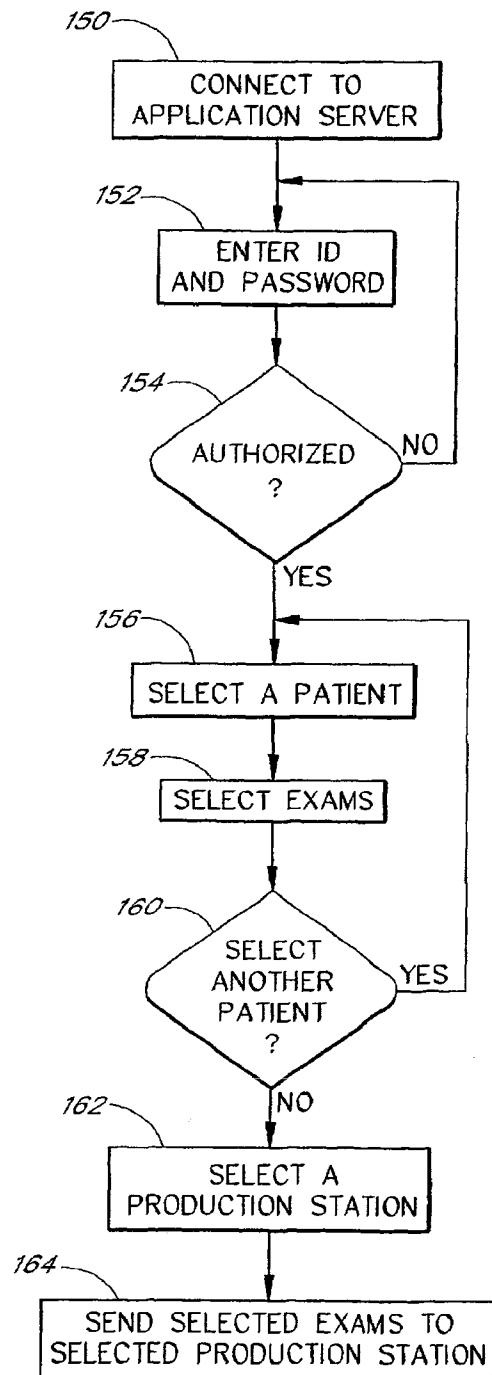


FIG. 4

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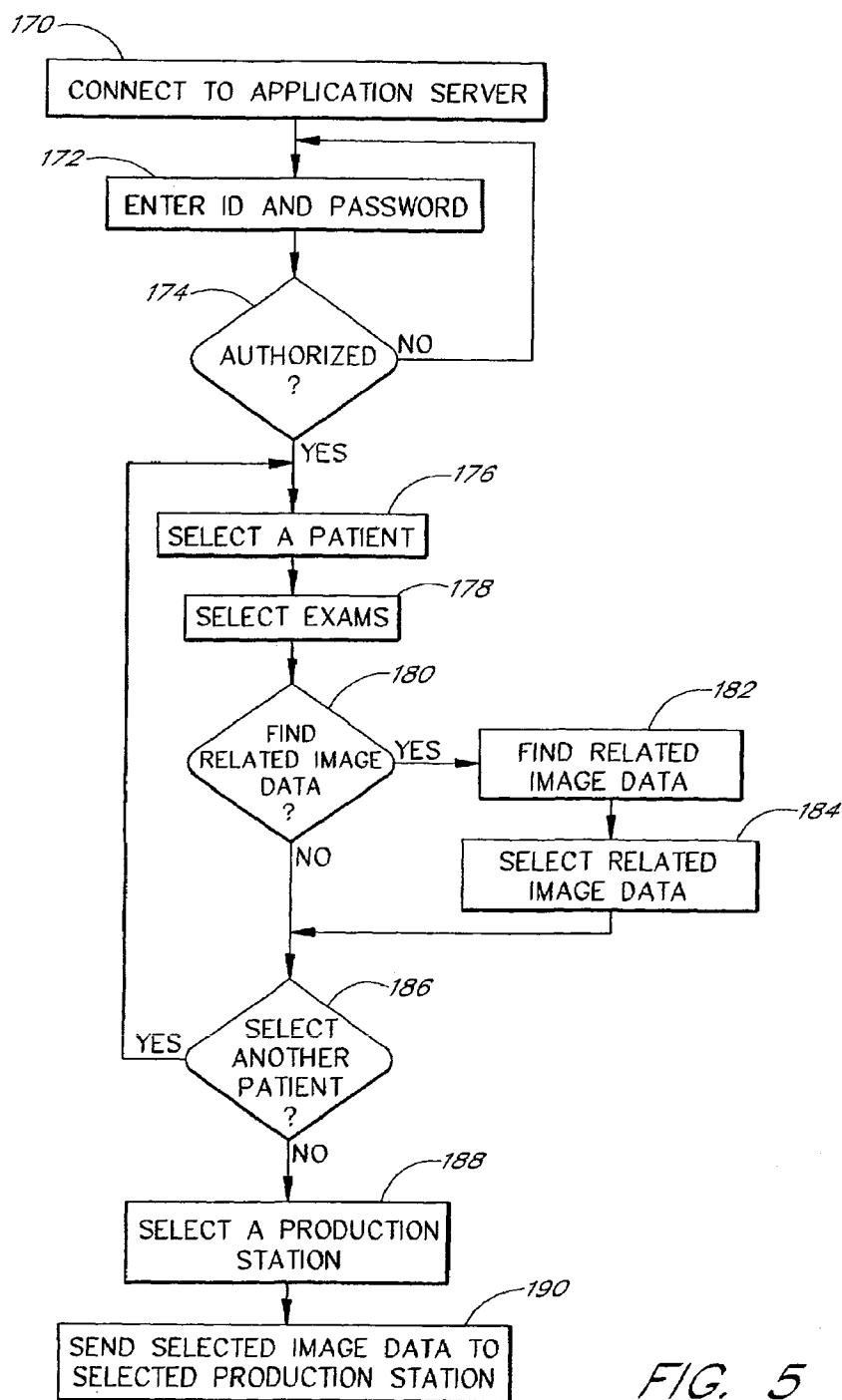


FIG. 5

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**SYSTEM AND METHOD FOR PRODUCING
MEDICAL IMAGE DATA ONTO PORTABLE
DIGITAL RECORDING MEDIA****CROSS REFERENCE TO RELATED
APPLICATIONS**

This non-provisional application claims priority date from the provisional patent application Ser. No. 60/181,985, titled "Medical Information System" and filed Feb. 11, 2000.

BACKGROUND OF THE INVENTION**1. Field of the Invention**

This invention relates to a system and method for the production of medical image data on portable digital recording media such as compact discs. More particularly, it relates to a system and method for receiving medical image data, processing medical image data, and transmitting medical image data to be recorded on a portable digital recording medium.

2. Description of the Related Art

Since the invention of the x-ray film, film has been the predominant multipurpose medium for the acquisition, storage, and distribution of medical images. However, the storage and distribution of film often requires considerable expenses in labor and storage space.

Today's modern hospitals utilize computer-aided imaging devices such as Computed Tomography (CT), Digital Subtracted Angiography, and Magnetic Resonance Imaging (MRI). These digital devices can generate hundreds of images in a matter of seconds. Many hospitals require these images to be printed on film for storage and distribution. To print complete sets of medical images from these digital devices, the cost in film material, storage space, and management efforts is often very high.

Some radiology departments have installed digital image storage and management systems known as PACS (Picture Archive Communication Systems). PACS are capable of storing a large amount of medical image data in digital form. PACS are made by manufacturers including GE, Siemens, and Fuji.

To ease the communication of data, the DICOM (Digital Imaging and Communications in Medicine) standard was developed by ACR-NEMA (American College of Radiology-National Electrical Manufacturer's Association) for communication between medical imaging devices and PACS. In addition to the examined images, patient demographics, and exam information such as patient name, patient age, exam number, exam modality, exam machine name, and exam date can also be stored and retrieved in DICOM compatible data format. A DICOM file stores patient and exam information in the header of the file, followed by the exam images. PACS store medical image data in DICOM format.

Digital medical image data can be stored on PACS and distributed using the Internet. However, many physicians' offices do not have the bandwidth suitable for fast download of medical image data. The concerns for medical data privacy and Internet security further reduce the desirability of Internet distribution.

SUMMARY OF THE INVENTION

The claimed system allows for digital medical image data to be produced on a portable digital recording medium such as a CD. A CD containing the medical image data can be

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distributed to physicians, hospitals, patients, insurance companies, etc. One embodiment of the claimed system allows for medical image data to be placed on a CD along with a viewing program, so that a user can use any computer compatible with the CD to view the medical image data on the CD. One embodiment of the claimed system allows for searching medical exam data that are related and placing such data on the same CD.

One embodiment of the claimed system comprises a receiving module configured to receive medical image data, a processing module configured to process the received medical image data, and an output module configured to transmit the processed medical image data to a production station configured to produce the transmitted medical image data on portable digital recording medium, such as a CD. In one embodiment, the output module transmits a viewing program configured to view medical image data to the production station so that the viewing program is produced on the same CD as the medical image data. In another embodiment, the CD already contains the viewing program before the medical image data is transmitted to the CD production station.

In one embodiment of the claimed system, the processing module is configured to create and store audit information of the portable digital recording medium produced by the production station.

In another embodiment of the claimed system, the processing module is configured to identify the originating image input device of the received medical image data, and determine, on the basis of the originating image input device, whether to transmit the received medical image data to a production station. The processing module also selects, on the basis of the originating image input device, one of multiple production stations as the target production station.

Yet another embodiment of the claimed system is configured to retrieve medical image data that are related to the received medical image data, and transmit the retrieved related image data to the production station. In one embodiment, exam images of the same patient are considered related. In another embodiment, exam images of the same patient and the same modality are considered related. For example, two x-ray exams on the left hand of the same patient are considered related. In yet another embodiment, exam images of the same patient, the same modality and taken within a specified date range are considered related. For example, two x-ray exams on the left hand of the same patient taken within a two-month period are considered related. A hospital may also determine other scenarios of relatedness.

One claimed method comprises the steps of connecting a browsing terminal to a computer database configured to store medical image data, selecting medical image data from medical image data stored on the database, and recording the selected medical image data on portable digital recording medium. In one embodiment, the claimed method also comprises a step of recording a viewing program configured to view medical image data on the portable digital recording medium.

One embodiment of the claimed method further comprises the steps of finding and retrieving medical image data that are related to the selected medical image data, and recording related image data to portable digital recording medium.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates one embodiment of an image production system comprising an application server and portable digital recording medium production stations.

FIG. 2 illustrates sample records of one embodiment of an image input device profile table.

FIG. 3 illustrates a process of receiving image data from image server, processing received image data, and transmitting such data to the production station. This process also retrieves and transmits related image data for production.

FIG. 4 illustrates a process of a user selecting and ordering the production of image data stored on the application server.

FIG. 5 illustrates a process of a user selecting and ordering the production of image data stored on the application server, with the option of selecting and ordering the production of related image data.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates one embodiment of an image production system 100 comprising an application server 110 and one or more portable digital recording medium production stations 300A, 300B and 300C. In the preferred embodiment, the production stations 300A, 300B and 300C are CD (Compact Disc) production stations. Digital portable recording medium comprises CDs and DVDs (Digital Versatile Disc or Digital Video Disc). CDs may comprise CD-ROM (Compact Disc Read Only Memory), CD-R (Compact Disc Recordable), and CD-RW (Compact Disc Recordable and Writable). DVDs may comprise DVD-ROM (DVD Read Only Memory), DVD-R (DVD Recordable) and DVD-RAM (a standard for DVDs that can be read and written many times). Thus, although the following description refers primarily to CDs, those of ordinary skill in the art will understand that any suitable portable digital recording medium can be substituted for CDs.

The application server 110 is connected to one or more physician browsing terminals 400A, 400B and 400C through a computer network 600. Each physician browsing terminal 400A, 400B or 400C comprises a browsing program such as Internet Explorer or Netscape Communicator. Physicians or their assistants launch the browsing program to access the application server 110 through the network 600 in order to select medical image data stored on the application server database 114 to be produced by a production station 300A, 300B or 300C. In the preferred embodiment, the physician browsing terminals 400A, 400B and 400C are connected to the application server through an Intranet. One embodiment of the Intranet utilizes TCP/IP network protocol. The Intranet can connect one radiology department, multiple departments within a hospital, or multiple hospitals. In another embodiment the browsing terminals 400A, 400B and 400C are connected to the application server 110 through the Internet.

Still referring to FIG. 1, the application server 110 is also connected to an image server 200. The image server 200 is further connected to image input devices such as PACS 204, MRI machines 206, CT-scan machines 208, ultrasound machines 210, etc. In the preferred embodiment, the image server 200 is a DICOM image server configured to receive and store medical image data in DICOM format. In operation, the image server 200 receives medical image data from image input devices such as PACS 204, MRI machines 206, CT-scan machines 208 and ultrasound machines 210 and

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stores such image data in the image server database 202. A high-resolution image scanner 500 is also connected to the image server 200, so that medical image data stored on film can be scanned on the image scanner 500, transmitted to the image server 200 and stored in the image server database 202. In one embodiment, the image scanner 500 also converts the scanned image to DICOM format. The application server 110 receives input image data from the image server database 202, processes the received image data, and sends the image data to one of the production stations 300A, 300B or 300C to produce CDs.

The application server 110 comprises a viewing program 112, an application server database 114 that stores image data received from the image server 200, a production history database 116 that stores audit records on each CD produced, a display terminal 118 for programming and operating the application server 110 by a programmer or physician, and an image input device profile table 120.

Still referring to FIG. 1, the viewing program 112 is configured to allow users to read and manipulate medical image data. The viewing program 112 comprises multiple image manipulation functions, such as rotating images, zooming in and zooming out, measuring the distance between two points, etc. The viewing program 112 also allows users to read the patient demographics and exam information associated with the image data. The viewing program 112 used in the preferred embodiment is produced by eFilm Medical Inc. located in Toronto, Canada. The viewing program 112 used in the preferred embodiment is an abbreviated version with fewer functions and takes less storage space, in order to maximize the storage space for image data on a CD. The image server 200 used in the preferred embodiment is also made by eFilm Medical Inc.

The CD production stations 300A, 300B and 300C in the preferred embodiment are produced by Rimage Corporation in Edina, Minn. Details about the Rimage CD production stations can be found in U.S. Pat. Nos. 5,542,768, 5,734,629, 5,914,918, 5,946,276, and 6,041,703, which are incorporated herein by reference in their entirety.

The application server 110 in the preferred embodiment runs on a personal computer running a 400 MHz Celeron or Pentium II/III chip, with Windows 98 or NT as the operating system.

FIG. 2 illustrates sample records of one embodiment of an image input device profile table 120. The image input device profile table 120 contains a profile record for each image input device. Each image input device's profile record comprises: (1) an "auto-produce" logical field 250 indicating whether medical image data from this image input device should be produced on CD automatically by the image production system 100, (2) a "target production station" field 252 identifying one of the production stations 300A, 300B or 300C on which medical image data is to be produced, and (3) a "related data storage" 254 field identifying the medical image data storage units in which to search for the related image data. A medical image data storage unit is a storage unit that stores medical image data and is connected to the application server 110. In one embodiment, a medical image data storage unit is connected to the application server 110 through the image server 200. In the preferred embodiment, PACS 204 is such a medical image data storage unit.

In FIG. 2, the sample profile table 120 contains profile records for MRI Machine I, MRI Machine II, and Ultrasound Machine I. For MRI Machine I, the "auto-produce" field 250 contains a "yes" value, directing the image production system 100 to automatically produce image data originating from MRI Machine I on portable digital record-

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ing medium. Its “target production station” field 252 contains a “Production Station A” value, directing the image production system 100 to produce image data originating from MRI Machine I on production station A. Its “related data storage” field 254 is “PACS I”, directing the image production system 100 to retrieve related medical image data from PACS I. For MRI Machine II, the “auto-produce” field 250 is “no”, directing the image production system 100 to not automatically produce image data originating from MRI Machine II on portable digital recording medium. Since image data from MRI Machine II will not be automatically produced, the “target production station” field 252 and the “related data storage” field 254 are irrelevant. For Ultrasound Machine I, the “auto-produce” field 250 is “yes”, and its “target production” filed 252 is “Production Station B”. Its “related data storage” field 254 contains a value of “PACS I, PACS II”, directing the image production system 100 to search PACS I and PACS II for related medical image data.

FIG. 3 illustrates a process of the application server 110 receiving image data from the image server 200, processing the received image data, and transmitting such data to the production station 300A, 300B or 300C. The application server 110 continuously monitors the image server database 202 in step 122. In one embodiment, the application server continuously “pings” the network address corresponding to the image server 200 on the network that connects the application server 110 with the image server 200.

Still referring to FIG. 3, the application server 110 determines if the image server database 202 is changing, in step 124. In the preferred embodiment, the application server 110 makes that determination by detecting whether the image server database 202 is increasing in size. If there is no change in the image server database 202, then the application server 110 returns to step 122 to continue monitoring. If there is change in the image server database 202, then the application server 110 proceeds to step 126 and time-stamps the moment that the change started. The application server 110 then proceeds to step 128 and waits for an interval, typically 35 to 65 seconds. After the interval, the application server 110 checks whether the image server database 202 is still changing, in step 130. If the image server database 202 is still changing then the application server 110 returns to step 128 to wait for another interval. If the image server database 202 is no longer changing, then the application server 110 proceeds to step 132 and copies the data changed since the time-stamped moment. This changed data is copied from the image server database 202 to the application server database 114.

The application server 110 proceeds to step 134 and finds the input image device name or identification number from the newly received image data. In the preferred embodiment, image data from the image server database 202 are stored in DICOM format, and the input image device name or identification number is stored in the header of the DICOM format image data file. The input image device name/ID indicates the origin of the newly received data. The application server 110 proceeds to step 136 and uses the found input image device name/ID to find a corresponding profile record in the image input device profile table 120. If the profile record has an “auto-produce” field 250 with a “no” value, the application server 110 returns from step 138 to step 122 to continue monitoring the image server database 202. If the “auto-produce” field 250 contains a “yes” value, the application server 110 proceeds from step 138 to step 140, and determines the target production station 300A, 300B or 300C from the “target production station” field 252

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of the profile record. In step 140, the application server 110 also determines the value in the “related data storage” field 254 of the profile record.

Still referring to FIG. 3, in step 142, the application server 110 sends a copy of the newly received data, along with a copy of the viewing program 112, to the target production station 300A, 300B or 300C identified in step 140. With the viewing program attached, the image data on each CD produced by the target production station 300A, 300B or 300C can be viewed on any computer that accepts the CD, regardless of whether that computer has its own viewing program installed. In one embodiment, the data received in step 132 is stored in the application server database 114 before it is transmitted to the target production station 300A, 300B or 300C in step 142. In another embodiment, the application server 110 transmits the data received in step 132 to the target production station 300A, 300B or 300C, without storing a copy of the data in the application server database 114.

20 In one embodiment, the application server 110 does not send a copy of the viewing program 112 to the target production station during step 142. Rather, the application server 110 sends a copy of the received medical image data to the production station 300A, 300B or 300C to be recorded on pre-burned CDs. Each pre-burned CD contains a viewing program already recorded onto the CD before step 142.

In step 142, the application server 110 also sends configuration data to the target production station 300A, 300B or 300C. The configuration data comprises a label-printing file comprising the specification for printing labels on top of the CDs, and a “number of copies” value indicating the number of copies of CDs to be produced. A typical specification in the label-printing file may specify information such as patient name, exam modality, hospital name, physician name, production date, etc. to be printed by the target production station as a label on the top of each CD produced.

Still referring to FIG. 3, in step 143, the application server 110 searches the application server database 114 for image data related to the newly received data. The application server 110 then searches the PACS systems identified in the “related data storage” field 254 in step 140 for data related to the newly received data. Some PACS systems each comprise a primary image data storage and an archive image data storage, and the application server 110 searches both the primary image data storage and the archive image data storage on these PACS systems. The application server 110 is connected to the PACS systems through the image server 200. The application server 110 retrieves found related data from the PACS systems and stores a copy of such found related data in the application server database 114. The application server 110 sends a copy of related data that are found from the application server database 114 or the PACS systems to the target production station 300A, 300B or 300C. The medical image data originally received in step 132 and the related medical image data are produced by the target production station 300A, 300B or 300C on the same CDs for comparative study.

For each CD to be produced, the application server 110 adds one audit record to the production history database 116 in step 144. The new audit record comprises the identification number of the CD and other relevant information about the CD, such as the physician who requested the production (if any), and the names of the patients whose exam images are on that CD.

Steps 142, 143 and 144 may be executed immediately before, concurrent with, or immediately after one another.

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The target production station 300A, 300B or 300C produces the CDs containing the medical image data and the viewing program sent to it, and prints a label on top of every CD, corresponding to the specification in the label-printing file. The number of CDs produced corresponds to the "number of copies" number sent by the application server 110 in step 142. When the target production station has produced the CDs, the production station returns a "completed" signal to the application server 110. The application server 110 waits for this signal in step 146.

Still referring to FIG. 3, in step 148, the application server 110 updates the audit records in the production history database 116 that were created in step 144. For each CD produced, the application 110 server updates the date and time of production for that CD's audit record. The application server 110 also updates the status value for that CD's audit storage record from "processing" to "successful". The application server 110 then continues monitoring the image server database 202 as in step 122.

FIG. 4 illustrates a process of a user selecting and ordering the production of image data stored on the application server 110. A user, typically a physician or physician's assistant, accesses the application server database 114 from a browsing terminal 400A, 400B or 400C connected to a network 600. In one embodiment, the user launches a browser such as Microsoft Internet Explorer or Netscape Communicator, and specifies a network address corresponding to the application server 110, in step 150. In another embodiment, the user clicks a pre-defined icon that directly launches a browser connecting to the application server 110. The application server 110 prompts the user to enter a password or an identification name coupled with a password, in step 152. The application server 110 checks if the entered identification/password is authorized in step 154. If the entered identification/password is not authorized the user is returned to step 152 to re-enter the identification/password, or disconnected from the application server 110. If the entered identification/password is authorized then the user is allowed access to the application server database 114 and the application server 110 proceeds to step 156.

Still referring to FIG. 4, in step 156 the user is prompted to select a patient from a list of patients with exam images in the application server database 114. The user is then shown a list of the selected patient's exams, and is prompted to select one or more exams of that patient, in step 158. When the user indicates that he/she has completed selecting all exams for that patient, the user is asked in step 160 whether to select another patient from the list of patients. If the user answers "yes", the user is returned to step 156 to select another patient. If the user answers "no", the user proceeds to step 162.

In another embodiment, when a user selects a patient, all exams belonging to that patient will be automatically selected without prompting for user selection. In yet another embodiment, the user is not prompted to select patients, but is only prompted to select exams from a list of all exams for all patients contained in the application server database 114.

When the user indicates that he/she has completed selecting, the user is prompted to select a production station from a list of production stations 300A, 300B and 300C in step 162. The user is also prompted to enter additional label text to be printed as labels on the CDs to be produced, to supplement the text printed according to the specification of the label-printing file. The user can advantageously select the production station located closest to his/her office. In one embodiment, only one production station is connected to the

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application server 110, and the lone production station will be the selected production station without prompting for user selection.

In one embodiment, the user is also prompted to select the number of copies of CDs to be produced. In another embodiment, the number of copies is set at one without prompting for user direction. As described above in connection with FIG. 3, in step 164, the application server 110 sends a copy of the image data of the selected exams for the selected patients to the selected production station, along with a copy of the viewing program 112, and configuration data comprising a label-printing file, additional label text, and a number indicating the number of copies of CDs to be produced. The production station 300A, 300B or 300C then produces one or more CDs containing the selected exams for the selected patients and the viewing program, with labels printed on top of the CDs according to the specification in the label-printing file and the user-entered additional label text.

20 In another embodiment, a user accesses the application server database 114 not from a browsing terminal 400A, 400B or 400C, but directly from the display terminal 118. In this embodiment the user directly proceeds from step 152. In this embodiment the user is typically a programmer or operator of the image production system 100.

FIG. 5 illustrates a process of a user selecting and ordering the production of image data stored on the application server 110, with the additional option of selecting and ordering the production of related data for comparative study. As described above in connection with FIG. 4, a user connects to the application server 110 from a browsing terminal 400A, 400B or 400C in step 170. The user enters identification information and a password in step 172. Step 174 determines whether the user is authorized to access the application server database 114. If authorized, the user is prompted to select a patient in step 176, and selects exams of the selected patient in step 178. The user is then asked in step 180 if he/she desires to find related data of that patient for comparative study.

40 If the user answers yes, the application server 110 then searches for related data. The application server 110 finds the image input device profile table 120 profile record corresponding to the image input device from which the selected data originates, identifies the list of PACS systems 45 stored in the "related data storage" field 254, and searches these PACS systems for related data. In another embodiment, once the user has selected a patient/exam combination, the application server 110 automatically searches for related data without asking for user direction. In this embodiment, the application server 110 alerts the user if related data are found. In one embodiment, the application server 110 also searches the application server database 114 for related medial image data.

Still referring to FIG. 5, the user is then prompted to select 55 all or some of the related data from the list of found related data for production, in step 184. In another embodiment, all found related data are automatically selected by the application server 110 for production, without prompting for user selection.

60 The user is then prompted to select another patient in step 186. After the user has completed selecting all patients, the user is prompted to select a CD production station 300A, 300B or 300C in step 188. The user is also prompted to enter additional label text. In step 190, the application server 110 then sends a copy of the original and selected related data, along with a copy of the viewing program 112, a number indicating the number of copies to be produced, additional

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label text, and a label-printing file to the selected production station 300A, 300B or 300C for production.

The above paragraphs describe the application server 110 with one database 114 for image data storage. In another embodiment, the application server 110 includes two databases for image data storage: a new data database and a storage data database. The new data database stores only the most recent batch of new data just received from the image server 200. After the data in the new data database is sent to a production station 300A, 300B or 300C, the application server 110 erases data in the new data database. The storage data database stores all data that has ever been received from the image server database 202. In the processes described by FIG. 4 and FIG. 5, a user selects images for production from the storage data database.

Several modules are described in the specification and the claims. The modules may advantageously be configured to reside on an addressable storage medium and configured to execute on one or more processors. The modules may include, but are not limited to, software or hardware components that perform certain tasks. Thus, a module may include, for example, object-oriented software components, class components, processes methods, functions, attributes, procedures, subroutines, segments of program code, drivers, firmware, microcode, circuitry, data, databases, data structures, tables, arrays, and variables. Modules may be integrated into a smaller number of modules. One module may also be separated into multiple modules.

Although the foregoing has been a description and illustration of specific embodiments of the invention, various modifications and changes can be made thereto by persons skilled in the art, without departing from the scope and spirit of the invention as defined by the following claims.

What is claimed is:

1. A system for selecting and automatically recording medical image data onto a data storage medium, the system being connected to a medical image server, the system comprising:
 - an application server;
 - a plurality of production stations;
 - a plurality of browsing terminals;
 - a network connecting the application server, the plurality of production stations and the plurality of browsing terminals, wherein the application server is configured to receive medical image data from the medical image server, the medical images received being formatted in a standard medical imaging format used by specialized computers configured for viewing medical images, the application server further comprising:
 - a selection module configured to allow a user to select selected medical image data via at least one of (a) a selected one of the plurality of browsing terminals and (b) the application server,
 - a search module configured to automatically search the medical image server for related medical image data that is related to the selected medical image data,
 - a configuration data module configured to allow a user to input identifying information relating to the selected medical image data,
 - a production station selection module configured to allow a user to select one of the plurality of production stations, wherein the selected production station is configured to receive the selected medical image data and the related medical image data to produce a data storage medium that has recorded on it the selected and the related medical image data, the

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selected medical image data being recorded on the data storage medium in the standard medical imaging format, and

an audit module configured to automatically provide an auditable trail of the selected medical image data; a viewing program for the standard medical imaging format that is recorded on the data storage medium, and that is configured to allow viewing of medical image data stored on the data storage medium on widely accessible computers not specifically configured with standard medical imaging software for viewing of medical images; and

a label automatically printed and applied to the data storage medium at the production station, the label containing the identifying information.

2. The system of claim 1, wherein the data storage medium is an optical disk.

3. The system of claim 1, wherein the auditable trail of the selected medical image data includes a record of when the selected medical image data and the related medical image data were recorded onto the data storage medium.

4. The system of claim 1, wherein the medical image server is configured to provide medical image data to the application server in response to generation of medical image data by an imaging modality coupled to the medical image server.

5. The system of claim 4, wherein the imaging modality is an image scanner configured to generate medical image data in a DICOM-compatible format from a film.

6. The system of claim 1, wherein the application server further comprises a user authentication module configured to authenticate a user's identification before the user is allowed to access the selection module.

7. The system of claim 1, wherein the application server further includes a database configured to store medical image data received from the medical image server.

8. The system of claim 7, wherein the selection module is further configured to provide the user with a listing of patients having medical image data stored in the database.

9. A system comprising:

- a medical image server configured to receive medical image data that is generated by a plurality of imaging modalities, the medical image data being formatted in a standard medical imaging format used by specialized computers configured for viewing medical images;
- a database configured to store medical image data generated by the plurality of imaging modalities;
- a plurality of browsing terminals configured to receive a user selection that defines selected medical image data;
- a search module configured to search the database for related medical image data that is related to the selected medical image data; and
- a production station that is configured to record all of the following onto a data storage medium:
 - the selected medical image data, recorded in the standard medical imaging format;
 - the related medical image data, recorded in the standard medical imaging format, and
 - a viewing program that is configured to allow viewing of the selected and the related medical image data that is recorded onto the data storage medium on widely accessible computers not specifically configured with standard medical imaging software for viewing of medical images.